GetStockQuote

Inputs
- tickerSymbol

(Inputs)

Outputs
- 1.0 LastTradeAmount
- Details
  - CompanyName
  - 1.0 DayHigh
  - 1.0 DayLow
  - 123 StockVolume
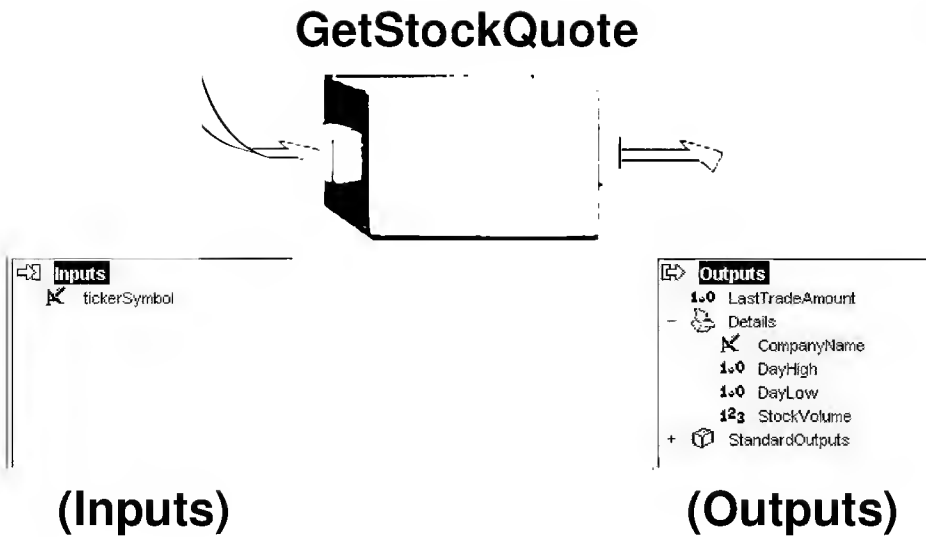- + StandardOutputs

(Outputs)

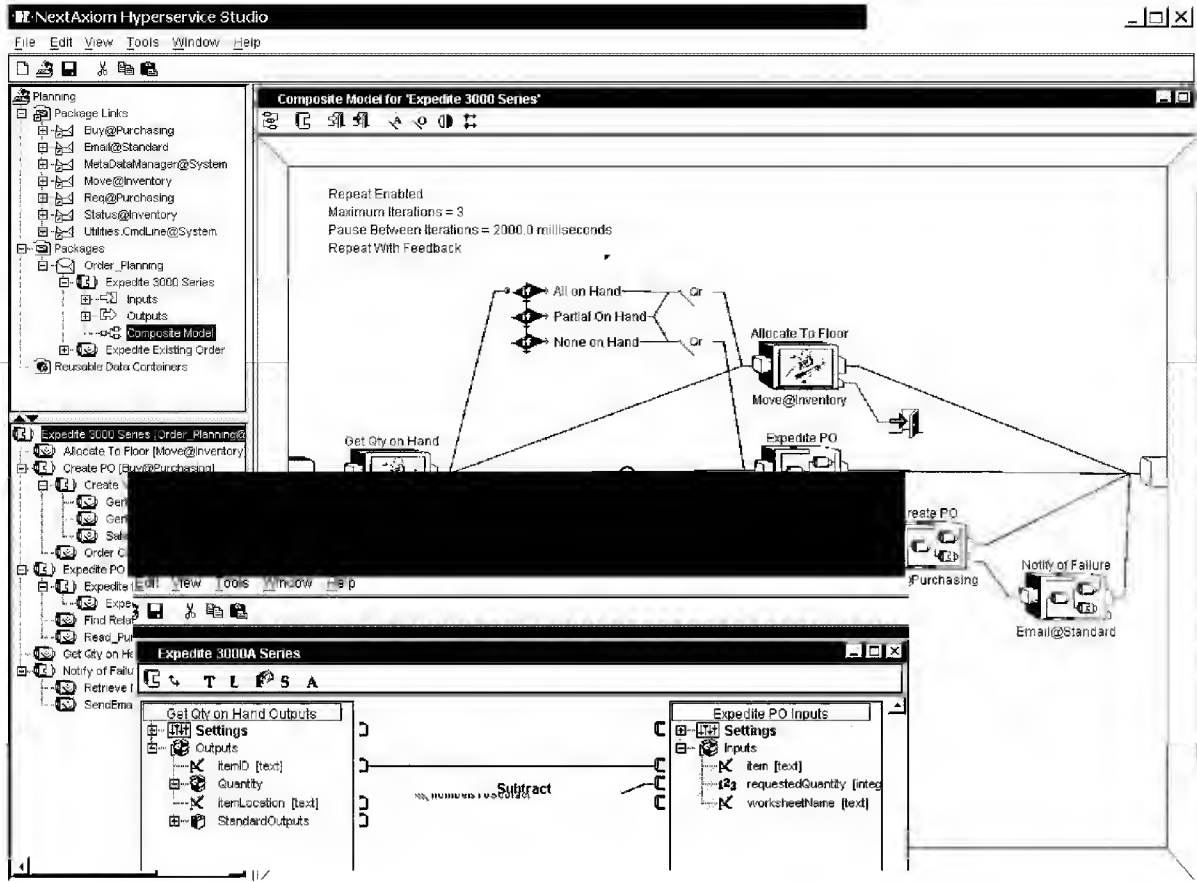# FIGURE 2: Composite service implementation

FIGURE 3: Composite service containing other software services

FIGURE 4: Mapping data elements between two connected software services

The outputs of WebService1 are mapped to the inputs of WebService2

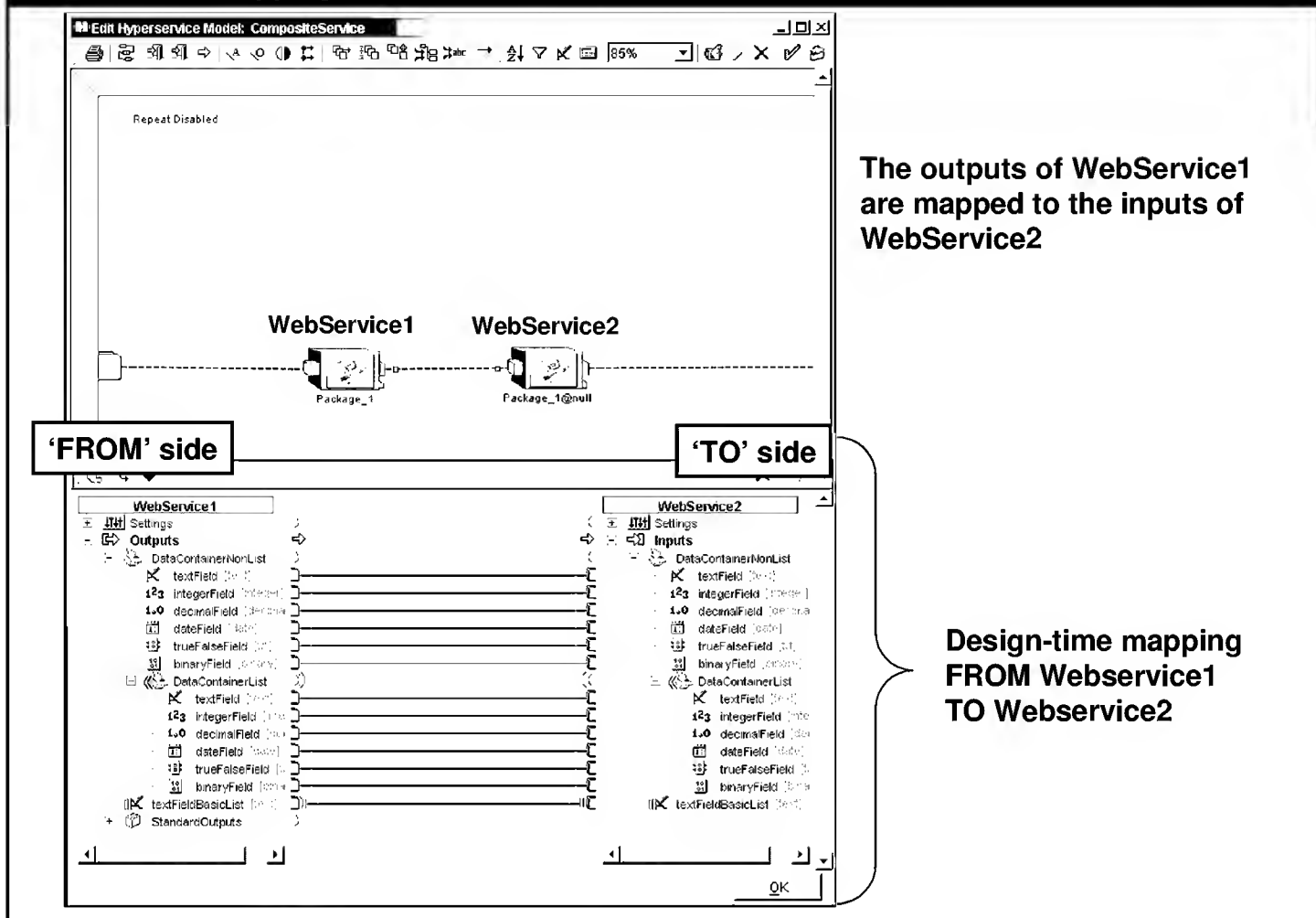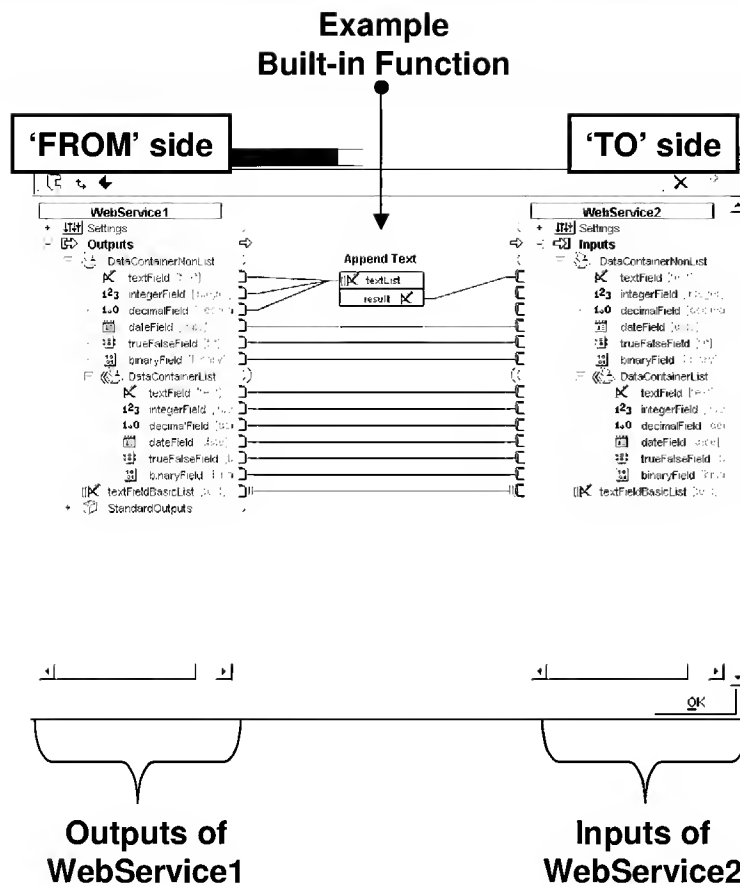Design-time mapping FROM Webservice1 TO Webservice2

FIGURE 5: XML representation of the mapping depicted in FIGURE 4

```xml
- <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1">
  - <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs" relativeDataPath="">
    - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/textField" fromDataPath="DataContainerNonList/textField"
          toAbsPath="Inputs/DataContainerNonList/textField" toDataPath="DataContainerNonList/textField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField"
          toAbsPath="Inputs/DataContainerNonList/integerField" toDataPath="DataContainerNonList/integerField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField"
          toAbsPath="Inputs/DataContainerNonList/decimalField" toDataPath="DataContainerNonList/decimalField" />
        <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/dateField" fromDataPath="DataContainerNonList/dateField"
          toAbsPath="Inputs/DataContainerNonList/dateField" toDataPath="DataContainerNonList/dateField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/trueFalseField" fromDataPath="DataContainerNonList/trueFalseField"
          toAbsPath="Inputs/DataContainerNonList/trueFalseField" toDataPath="DataContainerNonList/trueFalseField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/binaryField" fromDataPath="DataContainerNonList/binaryField"
          toAbsPath="Inputs/DataContainerNonList/binaryField" toDataPath="DataContainerNonList/binaryField" />
        <ConnectedPair fromAbsPath="Outputs/textFieldBasicList" fromDataPath="textFieldBasicList" isFromDataList="true" isToDataList="true"
          toAbsPath="Inputs/textFieldBasicList" toDataPath="textFieldBasicList" />
        <groupDataPathSegments numSegments="0" postDotConversion="true" />
      </CPFromGroup>
    - <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs/DataContainerNonList/DataContainerList"
        relativeDataPath="DataContainerNonList/DataContainerList">
      - <CPFromGroup groupAbsPath="Outputs/DataContainerNonList/DataContainerList" groupDataPath="DataContainerNonList/DataContainerList">
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/textField" fromDataPath="textField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/textField" toDataPath="textField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/integerField" fromDataPath="integerField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/integerField" toDataPath="integerField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/decimalField" fromDataPath="decimalField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/decimalField" toDataPath="decimalField" />
          <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/DataContainerList/dateField" fromDataPath="dateField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/dateField" toDataPath="dateField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/trueFalseField" fromDataPath="trueFalseField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/trueFalseField" toDataPath="trueFalseField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/binaryField" fromDataPath="binaryField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/binaryField" toDataPath="binaryField" />
        - <groupDataPathSegments numSegments="1" postDotConversion="true">
            <Segment dataPath="DataContainerNonList/DataContainerList" index="0" />
          </groupDataPathSegments>
        </CPFromGroup>
      </ToListGroup>
    </ToListGroup>
  </IncomingNode>
```

FIGURE 6: Mapping between two software services with a Built-in Function in between

Example
Built-in Function

'FROM' side

'TO' side

WebService1

Outputs

WebService2

Inputs

Append Text

textList

result

Design-time mapping FROM
Webservice1 TO Webservice2,
similar to FIGURE 4, except with a
Built-in Function in between that
will append data from multiple
data elements into one.

Outputs of
WebService1

Inputs of
WebService2

```xml
- <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1">
  - <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs" relativeDataPath="">
    - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
        <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/dateField" fromDataPath="DataContainerNonList/dateField"
          toAbsPath="Inputs/DataContainerNonList/dateField" toDataPath="DataContainerNonList/dateField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/trueFalseField" fromDataPath="DataContainerNonList/trueFalseField"
          toAbsPath="Inputs/DataContainerNonList/trueFalseField" toDataPath="DataContainerNonList/trueFalseField" />
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/binaryField" fromDataPath="DataContainerNonList/binaryField"
          toAbsPath="Inputs/DataContainerNonList/binaryField" toDataPath="DataContainerNonList/binaryField" />
        <ConnectedPair fromAbsPath="Outputs/textFieldBasicList" fromDataPath="textFieldBasicList" isFromDataList="true" isToDataList="true"
          toAbsPath="Inputs/textFieldBasicList" toDataPath="textFieldBasicList" />
        <groupDataPathSegments numSegments="0" postDotConversion="true" />
      - <TransformationNode categoryName="Transform" incomingCpfgAbsPath="Outputs" outgoingTlgAbsPath="Inputs" transformationName="Append Text">
        - <OutgoingCPairs>
            <ConnectedPair fromDataIndex="0" toAbsPath="Inputs/DataContainerNonList/textField" toDataPath="DataContainerNonList/textField" />
          </OutgoingCPairs>
        - <IncomingCPairs>
            <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/textField" fromDataPath="DataContainerNonList/textField" isToDataList="true"
              toDataIndex="0" />
            <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField" isToDataList="true"
              toDataIndex="0" />
            <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField" isToDataList="true"
              toDataIndex="0" />
          </IncomingCPairs>
          <![CDATA[ x=98,y=52,largeIcon=true ]]>
        </TransformationNode>
      </CPFromGroup>
    - <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs/DataContainerNonList/DataContainerList" relativeDataPath="DataContainerNonList/DataContainerList">
      - <CPFromGroup groupAbsPath="Outputs/DataContainerNonList/DataContainerList" groupDataPath="DataContainerNonList/DataContainerList">
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/textField" fromDataPath="textField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/textField" toDataPath="textField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/integerField" fromDataPath="integerField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/integerField" toDataPath="integerField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/decimalField" fromDataPath="decimalField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/decimalField" toDataPath="decimalField" />
          <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/DataContainerList/dateField" fromDataPath="dateField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/dateField" toDataPath="dateField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/trueFalseField" fromDataPath="trueFalseField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/trueFalseField" toDataPath="trueFalseField" />
          <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/binaryField" fromDataPath="binaryField"
            toAbsPath="Inputs/DataContainerNonList/DataContainerList/binaryField" toDataPath="binaryField" />
        - <groupDataPathSegments numSegments="1" postDotConversion="true">
            <Segment dataPath="DataContainerNonList/DataContainerList" index="0" />
          </groupDataPathSegments>
        </CPFromGroup>
      </ToListGroup>
    </ToListGroup>
  </IncomingNode>
```

The XML element, 'TransformationNode', represents the Built-in Function depicted in FIGURE 6

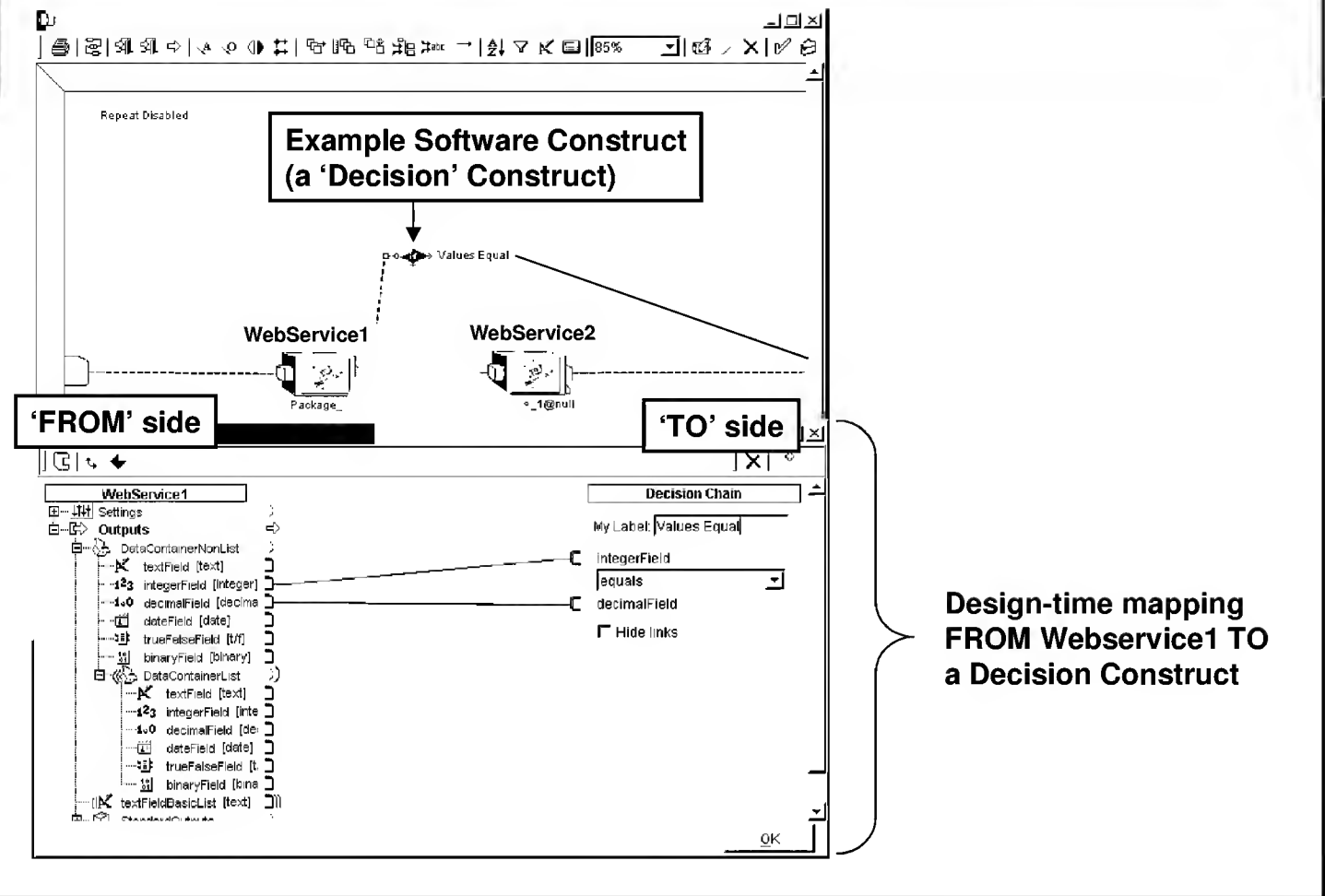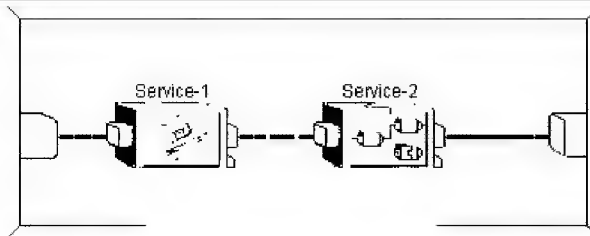**FIGURE 8:** mapping between a software service and an example software construct

Example Software Construct (a 'Decision' Construct)

'FROM' side

'TO' side

Design-time mapping FROM Webservice1 TO a Decision Construct

FIGURE 9: **XML representation of mapping to a Decision Construct depicted in FIGURE 8**

```
- <DecisionConstruct id="3" occurrence="1">
    <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1" />
    <![CDATA[ x=372,y=189,  ]]>
- <DecisionBranch branchType="if" customLabel="Values Equal" lhsIncomingKey="1000_116_19861858601.1" operator="equals" rhsIncomingKey="1000_116_19861858601.1"
    useCustomLabel="true">
  - <LHS_OR_Common>
    - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField" toDataIndex="0" />
        <groupDataPathSegments numSegments="0" postDotConversion="true" />
      </CPFromGroup>
    </LHS_OR_Common>
  - <RHS>
    - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
        <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField" toDataIndex="1" />
        <groupDataPathSegments numSegments="0" postDotConversion="true" />
      </CPFromGroup>
    </RHS>
  </DecisionBranch>
  <DecisionBranch branchType="else" customLabel="My Label" operator="equals" />
</DecisionConstruct>
```

The XML element, 'DecisionConstruct', represents the Decision Construct depicted in FIGURE 8

Figure 10: Mapping that results in data "flattening"

DESIGN-TIME:
Defining how data should be transferred from Service-1 to Service-2. Mappings where data is flattened is marked by an asterisk⊛
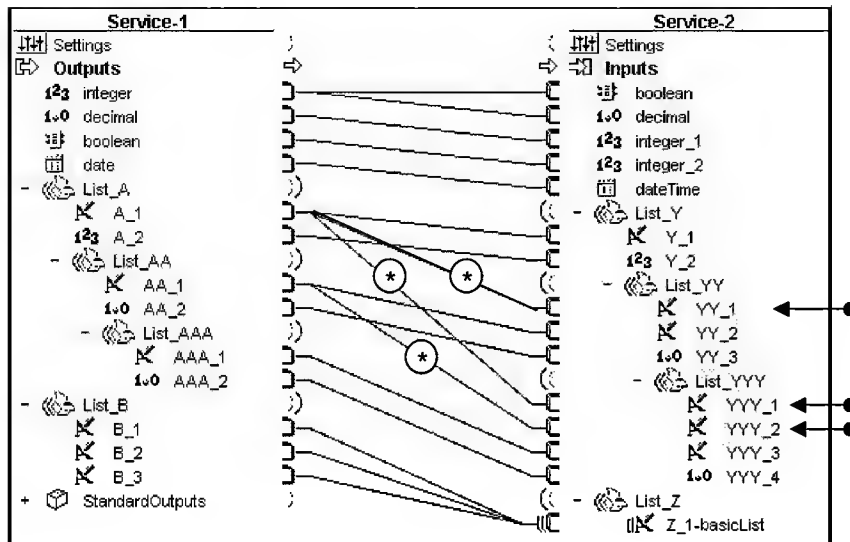
FIGURE 12: Defining One-to-Many and Many-to-One Data Mapping between services
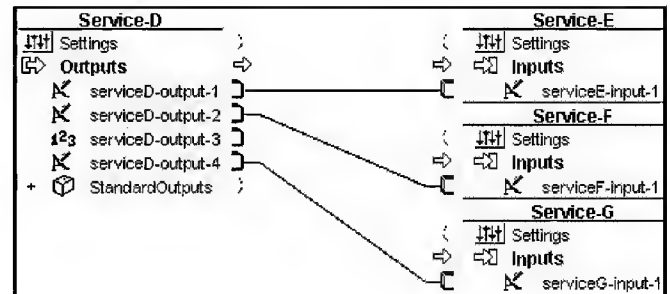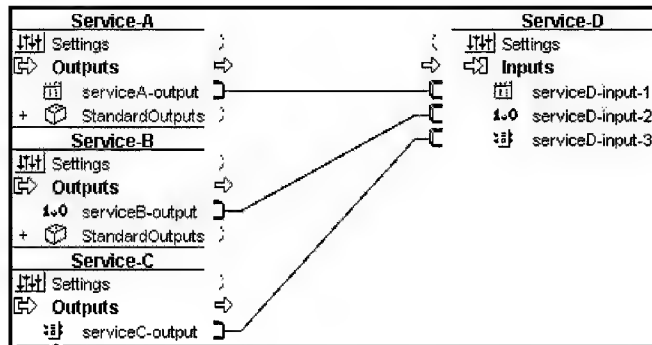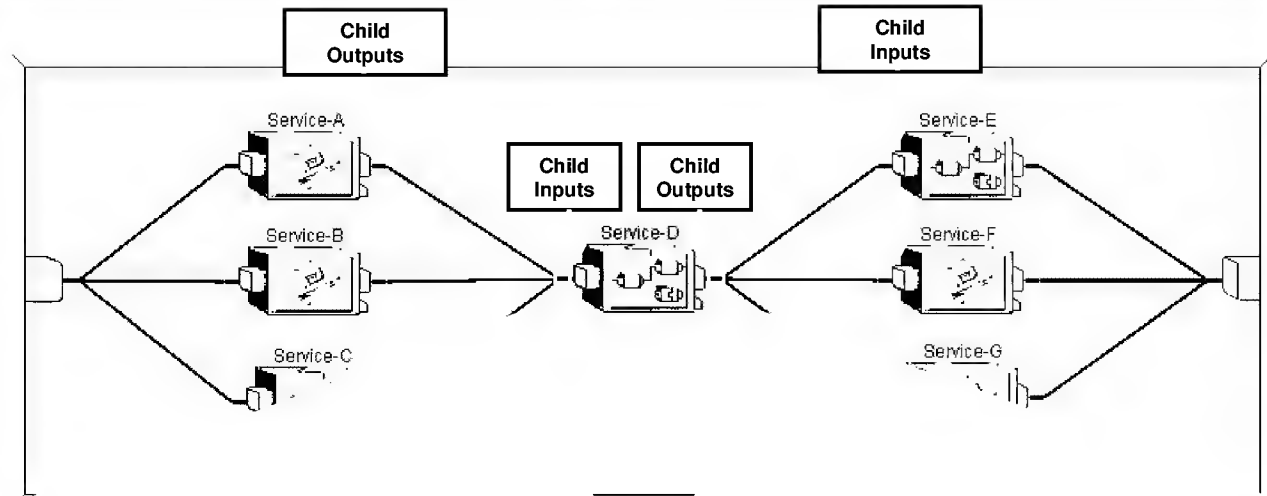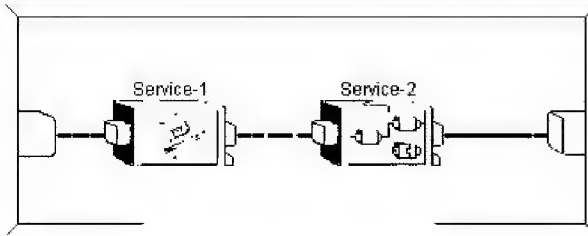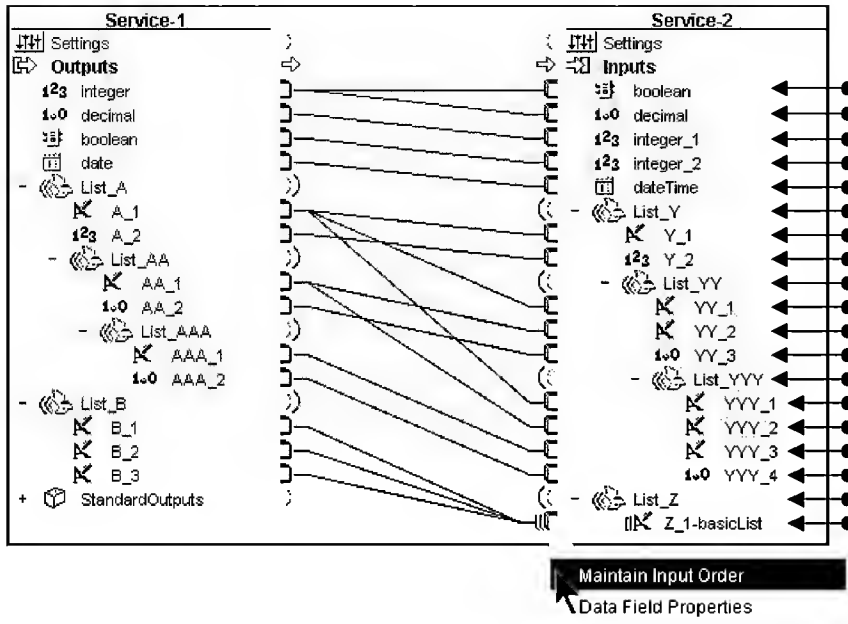
Figure 13A: Design-time – Defining Data Mapping with implicit data conversion

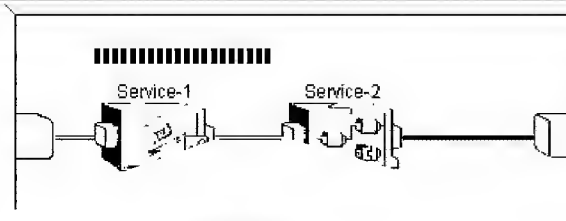DESIGN-TIME:
Defining how data should be transferred from Service-1 to Service-2

Figure 13B: Run-time – Automatic Data Transfer & Data Conversion

RUN-TIME:
Data is automatically transferred (and converted when necessary) from Service-1 Outputs to Service-2 Inputs

Modify/Evaluate: Service-1 (
Evaluate/Modify Outputs

Service-1 Outputs	⊡Σ	1
integer	0	
decimal	10.5	
boolean	true	
date	JAN-03-2003	
– List_A	⊡Σ X 1 2 3	
A_1	A_1 item 1	
A_2	1	
– List_AA	⊡Σ X 1 2	
AA_1	AA_1 item 1	
AA_2	1.1	
– List_AAA	⊡Σ X 1 2 3 4	
AAA_1	AAA_1 item 1	
AAA_2	1.11	
– List_B	⊡Σ X 1 2 3	
B_1	B_1 item 1	
B_2	B_2 item 1	
B_3	B_3 item 1	

Modify/Evaluate: Service-2 Inputs
Evaluate/Modify Inputs

Service-2 Inputs	⊡Σ	1
boolean	false	
decimal	0	
integer_1	11	
integer_2	1	
dateTime	2003/01/03 00:00:00.000	
– List_Y	⊡Σ X 1 2 3	
Y_1	A_1 item 1	
Y_2	1	
– List_YY	⊡Σ X 1 2	
YY_1	A_1 item 1	
YY_2	AA_1 item 1	
YY_3	1.1	
– List_YYY	⊡Σ X 1 2 3 4	
YYY_1	A_1 item 1	
YYY_2	AA_1 item 1	
YYY_3	AAA_1 item 1	
YYY_4	1.11	
– List_Z	⊡Σ X 1 2 3	
Z_1-basicList	B_1 item 1, B_2 item 1, B_3 item 1	

B_1 item 1
B_2 item 1
B_3 item 1